

SolidStateBattery

Weekly Intelligence Report

2026-07-26 | 18 articles | 7 countries
troy-technical.jp

This Week's Keyword

Solid-State Race

China, Japan, Korea accelerate commercialization

18

articles

Total Articles Analyzed

7

countries

Source Countries

500

Wh/kg

Peak Energy Density

2028

year

Earliest EV Debut Target

All 18 Articles This Week — 5-Axis Evaluation Matrix

How to read columns — Tech Novelty: degree of breakthrough Market Proximity: closeness to commercialization Market Impact: industry-wide effect Data Reliability: quantitative data & peer review US/EU Relevance: direct impact on US/European companies & supply chains

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#01	SwRI/SMU Interface	Research						US researchers pioneer nanoscale interfacial engineering to stabilize Li metal anodes, enhancing solid-state battery performance.
#02	MDPI Grid SSB Review	Analysis						Review highlights ASSB potential for grid storage, notes sulfide electrolyte progress, but mass production not until 2028-2032.
#03	QS/Honda SSB Partner	Corporate Strategy						QuantumScape and Honda partner to accelerate QSE-5 solid-state battery development for automotive integration.
#04	China Stationary SSB	Product Demo						Chinese stationary solid-state battery operates stably for a year in harsh conditions, proving robustness for grid.
#05	Toyota SSB 2028 Target	Product Announcement						Toyota targets 745-mile range, sub-10-minute charging for 2028 Lexus EV debut with solid-state battery.
#06	Geely 400 Wh/kg SSB	Product Announcement						Geely unveils a 400 Wh/kg solid-state battery, claiming double Tesla's energy density, nearing commercial deployment.
#07	China Hybrid/SSB Scale	Market Overview						Chinese firms scale hybrid solid-liquid battery production; CATL reports 420 Wh/kg, >1500 cycles for 3rd-gen SSB.
#08	Samsung 500 Wh/kg SSB	Product Announcement						Samsung unveils a 600-mile range, 500 Wh/kg solid-state battery, promising enhanced safety and fast charging.
#09	Sila Silicon Anodes	New Material						Sila secures \$300M to expand Washington plant, scaling silicon-carbon anodes for 20% higher energy density in Li-ion.
#10	China SSB Standard	Regulatory						China enacts world's first national standard for vehicle solid-state batteries, defining liquid content and energy density.
#11	Sumitomo Halide Electrolyte	New Material						Sumitomo Chemical prepares mass production of halide-based solid electrolyte, targeting cost-effective sulfide-equivalent performance.
#12	In-Situ DEMS for SSB	Research Method						In-situ DEMS accelerates safety validation for solid-state/hybrid batteries by real-time monitoring of interface stability.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#13	China Semi-Solid MP	Product Adoption	●●○○○ ○	●●●●● ●	●●●●● ○	●●●○○ ○	●●●○○ ○	2026 sees mass production of semi-solid batteries (350-400 Wh/kg) in Chinese EVs, leveraging existing production lines.
#14	SwRI/SMU Dendrite	Research	●●●●● ○	●●○○○ ○	●●●○○ ○	●●○○○ ○	●●●●● ●	SwRI and SMU research ultra-thin films on lithium anodes to suppress dendrite formation and extend solid-state battery lifespan.
#15	Stellantis/Factorial	Product Demo	●●●○○ ○	●●●●● ○	●●●●● ○	●●●○○ ○	●●●●● ●	Stellantis plans 2026 demonstration fleet of EVs powered by US-based Factorial Energy's polymer-based solid-state batteries.
#16	Tohoku Dendrite Conc.	Research	●●●●● ●	●○○○○ ○	●●●○○ ○	●●●●● ●	●●●○○ ○	Tohoku University discovers optimal lithium salt concentration to suppress dendrites, enhancing lithium metal battery safety.
#17	KnowMade Patent Trends	Analysis	●○○○○ ○	●○○○○ ○	●●●○○ ○	●●●○○ ○	●●●●● ●	KnowMade reports Q2 2026 solid-state battery patent surge, with CATL, Gotion, POSCO, Chery accelerating IP activities.
#18	Toyota SSB State Est. IP	Analysis	●●○○○ ○	●○○○○ ○	●●●○○ ○	●●●○○ ○	●●●○○ ○	Patsnap report shows Toyota dominates solid-state battery state estimation IP, holding 26 of 44 patents.

●●●●● High ●●●○○ Med-High ●●○○○ Med ●○○○○ Low | Yellow highlight = featured article

Three Questions That Demand Your Decision This Week

❶ Is your EV roadmap competitive with Asian SSB targets?

Toyota (745-mile, <10min charge by 2028), Samsung (600-mile, 500 Wh/kg), and Geely (400 Wh/kg) are setting aggressive performance benchmarks. Does your current battery strategy match these targets, or risk falling behind?

❷ How will China's SSB standard impact your supply chain?

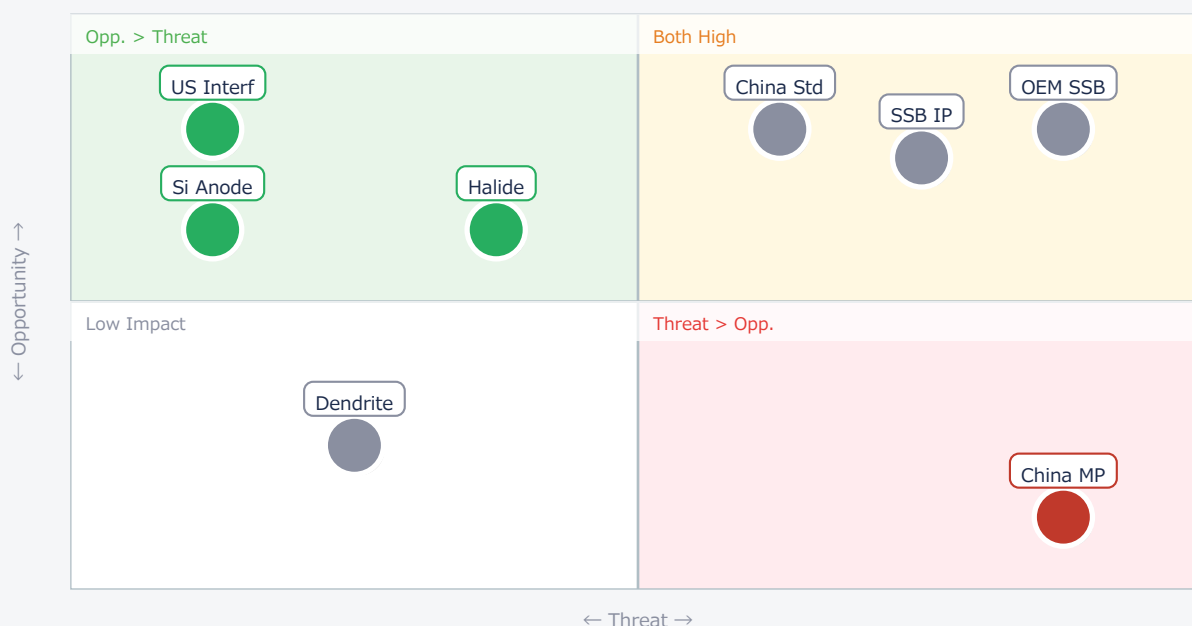
China's new national standard (GB/T 43568-2026) defines liquid content and energy density for vehicle solid-state batteries. Is your supply chain exposed to non-compliant materials or components, and what are the implications for market access?

❸ Are your material and IP strategies keeping pace with the SSB race?

Asian firms are accelerating patenting in solid electrolytes and state estimation, while US/EU companies innovate in silicon anodes and interface engineering. Are you proactively securing critical IP and developing next-gen materials?

Opportunities vs. Threats for US/European Companies

Opportunity vs. Threat Matrix for US/European Companies



Item	Quadrant	↑ Opportunity	↓ Threat
● OEM SSB	Critical	New EV market	Market share loss
● China MP	Threat	Supply chain alt	Market erosion
● China Std	Critical	Clear definitions	Market barrier
● US Interf	Opp.	Core tech dev	—
● Halide	Opp.	Cost-eff SSB	—
● Si Anode	Opp.	Li-ion upgrade	—
● SSB IP	Critical	License IP	IP infringement

● Dendrite	Ref.	Fund. insight	—
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Deep Dive ① — Toyota's Ambitious 2028 SSB Targets

#05 | 2026/07/22 | EVCUBE.NET | Tech Novelty ●●●●○ Proximity ●●●○○ Market Impact ●●●●● Data Reliability ●●●○○ US/EU Relevance ●●●●●

Toyota plans to debut its all-solid-state battery in luxury Lexus models by 2028, targeting an astounding 745-mile range and sub-10-minute full recharge times. This aims for commercial energy densities of 400–500 Wh/kg, double current Li-ion packs.

The technology relies on sulfide-based solid electrolytes, with collaborations with Idemitsu Kosan and Sumitomo Metal Mining for material development. If successful, this could fundamentally shift EV market perceptions and accelerate adoption.

► Strategic Analyst's Perspective

Strategic Analyst's Perspective: Toyota's targets are highly ambitious and, if achieved, would be a game-changer. The 400-500 Wh/kg energy density is plausible in lab settings but scaling to automotive-grade reliability and cost-effectiveness by 2028 remains a significant technical barrier, especially for sulfide electrolytes. [Opportunity] for US/EU materials & component suppliers to partner with Toyota or develop competing solutions. [Threat] for US/EU OEMs and device manufacturers if they cannot match these performance metrics, risking market share loss. Next actions: [R&D;] Evaluate current SSB roadmaps against Toyota's targets by end of Q3 2026. [Strategy] Assess potential impact on EV product cycles and competitive positioning by Q4 2026.

Deep Dive ② — Stellantis & Factorial Energy's 2026 EV Demo

#15 | 2026/07/16 | Benchmark Minerals Intelligence | Tech Novelty ●●●○○ Proximity ●●●●○ Market Impact ●●●●○ Data Reliability ●●●○○ US/EU Relevance ●●●●●

Stellantis plans to deploy a demonstration fleet of EVs powered by Factorial Energy's all-solid-state batteries in 2026. Factorial's FEST™ technology combines a lithium-metal anode with a polymer-based solid-state electrolyte.

This initiative, following formal automotive qualification, marks a critical step towards commercialization. The demonstration fleet will provide crucial real-world data on performance, durability, and safety, accelerating market deployment.

► Strategic Analyst's Perspective

Strategic Analyst's Perspective: The Stellantis-Factorial partnership is a strong indicator of near-term SSB commercialization, particularly for polymer-based electrolytes which may offer easier manufacturing integration. While polymer electrolytes often have lower ionic conductivity than sulfides, their safety and compatibility with existing lines are key advantages. [Opportunity] for US/EU OEMs to accelerate their own SSB integration via partnerships, and for technology licensors to offer complementary solutions (e.g., BMS, thermal management). [Threat] for OEMs without clear SSB strategies, as early movers gain significant market advantage. Next actions: [Business Dev] Identify and engage with promising SSB startups for potential partnerships by Q4 2026. [Procurement] Begin evaluating long-term supply chain implications for solid-state battery components by Q1 2027.

Deep Dive ③ — China's Hybrid/SSB Production Scale-Up

#07 | 2026/07/24 | Shanghai Metals Market (SMM) | Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●○
Data Reliability●●●○○ US/EU Relevance●●●●○

2026 marks mass production of hybrid solid-liquid batteries in China, with accelerated R&D; for all-solid-state. CATL reports 420 Wh/kg and >1500 cycles for its 3rd-gen condensed solid-state battery, drawing significant attention.

Chinese firms are rapidly expanding material production, with Huashang Zhongke and Tinci Materials launching Li₂S/sulfide electrolyte pilot lines. Shin-Etsu (Xinzhoubang) also started mass sales of oxide electrolytes, targeting 1,000-ton/year capacity.

► Strategic Analyst's Perspective

Strategic Analyst's Perspective: China's rapid scaling of hybrid solid-liquid batteries and aggressive ASSB R&D, led by giants like CATL, is a significant competitive threat. The reported 420 Wh/kg from CATL is highly competitive, and their focus on mass production capabilities for core materials (Li₂S, sulfide/oxide electrolytes) indicates a strategic push for global leadership. [Opportunity] for US/EU procurement managers to explore diversified sourcing options for advanced battery materials, but with careful due diligence on quality and IP. [Threat] for US/EU materials & component suppliers and OEMs if they cannot match the speed and scale of Chinese innovation and production. Next actions: [Procurement] Conduct a detailed analysis of Chinese SSB material suppliers and their capabilities by Q4 2026. [Strategy] Develop a competitive intelligence report on Chinese battery technology roadmaps and market entry strategies by Q1 2027.

Other Notable Articles

Samsung Unveils 600-Mile Solid-State Battery, Achieving 500 Wh/kg with Enhanced Safety and Fast Charging Capabilities (Top Speed)
Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●●

Samsung's 500 Wh/kg SSB with 600-mile range and fast charging is a major benchmark for next-gen EVs.

Next-Gen Battery Material Startup Sila Secures \$300M to Expand Washington State Plant, Elevating Energy Density with Silicon-Carbon Anodes (GeekWire)
Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●○○

US-based Sila's silicon-carbon anodes offer a 20% energy density boost for Li-ion, scaling production for EVs and electronics.

China Enacts World's First National Standard for Vehicle Solid-State Batteries, 'GB/T 43568-2026', Ending Industry Ambiguity ((情報元なし、記事内容より判断))
Tech Novelty●●○○○ Proximity●●●●● Market Impact●●●●●

China's new SSB standard defines liquid content (<0.5%) and energy density (400 Wh/kg), setting a global benchmark.

Sumitomo Chemical Begins Mass Production Preparations for Halide-Based Solid Electrolyte for EVs, Targeting Cost-Effective Sulfide-Equivalent Performance with Existing Lines (Just Auto)
Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●○

Sumitomo's halide electrolyte promises cost-effective SSB performance, compatible with existing Li-ion production lines.

Recommended Actions This Week

Action recommendations based on article evaluation matrix and opportunity/threat analysis.

■ Immediate (this week)

- [Executive] Review competitive landscape for EV battery performance targets (745-mile range, 500 Wh/kg) set by Asian OEMs.
- [Procurement] Initiate assessment of potential supply chain exposure and compliance requirements related to China's new SSB standard (GB/T 43568-2026).

■ Short-term (1 month)

- [R&D;] Conduct internal workshop to evaluate feasibility and timeline for achieving nanoscale interfacial engineering breakthroughs for solid-state battery stability.
- [Strategy] Begin IP landscaping specifically for solid electrolyte materials (halide, sulfide, polymer) and battery state estimation technologies, focusing on Asian competitors.
- [Business Dev] Identify US/EU SSB startups (e.g., Factorial Energy, Sila) for potential strategic partnerships or investment opportunities.

■ Medium-long term (quarter+)

- [R&D;] Allocate resources for long-term research into novel solid electrolyte materials and advanced anode designs (e.g., silicon-carbon composites) to maintain technological leadership.
- [Procurement] Develop a diversified sourcing strategy for critical SSB materials, considering both Western and Asian suppliers, to mitigate geopolitical risks and ensure supply resilience.
- [Strategy] Formulate a comprehensive solid-state battery commercialization roadmap, including manufacturing scale-up plans and cost reduction targets, to compete with aggressive Asian market entries.

SolidStateBattery — Selected Articles

Date: 2026-07-26

Articles: 18

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- #15 Stellantis Plans 2026 Demonstration Fleet of EVs Powered by Factorial Energy's Solid-State Batteries

#16 Tohoku University Discovers Optimal Lithium Concentration for Lithium Metal Batteries:
New Guidelines for Dendrite Suppression and Enhanced Safety

#17 KnowMade Reports Q2 2026 Solid-State Li-ion Battery Patent Trends: CATL, Gotion,
POSCO, Chery Accelerate IP Activities

#18 Toyota Dominates Solid-State Battery State Estimation Patent Landscape: Patsnap
Report Reveals 26 of 44 Patents Held

#01 SwRI and SMU Pioneer Nanoscale Interfacial Engineering for Enhanced Solid-State Battery Performance

Published July 16, 2026 Southwest Research Institute USA



OVERVIEW

Southwest Research Institute (SwRI) and Southern Methodist University (SMU) have initiated a collaborative research project focused on advancing solid-state battery technology by overcoming critical electrode-electrolyte interface degradation. Their innovative approach utilizes "interfacial engineering" to deposit nanometer-thick ultrathin films, specifically addressing the unstable interface between lithium metal anodes and solid electrolytes. This breakthrough aims to significantly improve battery performance and stability, accelerating the practical implementation of next-generation solid-state batteries for various applications.

Key Findings

A joint research team from Southwest Research Institute (SwRI) and Southern Methodist University (SMU) is developing and demonstrating a novel "interfacial engineering" process to deposit nanometer-thick ultrathin films. This technology is designed to overcome one of the primary hurdles in solid-state batteries: degradation at the electrode-electrolyte interface, particularly focusing on the unstable interface between lithium metal anodes and solid electrolytes. This advancement holds the potential to dramatically enhance battery performance and stability.

Technical Details

- Solid-state batteries offer inherent advantages in safety and energy density compared to conventional liquid-electrolyte lithium-ion batteries. However, interfacial issues such as high contact resistance and lithium dendrite formation have historically limited their performance and lifespan.
- The "interfacial engineering" technique employed in this research involves creating an extremely thin, nanometer-scale protective layer on the electrode surface. This layer optimizes the chemical and electrochemical reactions at the interface, ensuring smooth lithium-ion transport while suppressing detrimental side reactions.
- Specifically, the goal is to stabilize the interface that typically forms between lithium metal anodes and sulfide or oxide-based solid electrolytes. By doing so, the team expects to minimize degradation during prolonged charge-discharge cycling, leading to substantially improved long-term reliability.

Background & Context

Global research and development in solid-state batteries are accelerating, with interfacial design recognized as a critical factor for performance enhancement. Current lithium-ion batteries pose safety concerns due to the flammability of liquid electrolytes and the risk of short circuits from dendrite formation. Solid-state batteries are anticipated as a fundamental solution to these issues, representing a next-generation technology.

The collaboration between SwRI and SMU strategically combines the strengths of both basic and applied research institutions. This synergy aims to integrate theoretical insights with practical approaches, facilitating rapid technological development.

Strategic Significance & Outlook

The progress in this interfacial engineering is a crucial milestone toward the commercialization of solid-state batteries. It is expected to significantly accelerate the adoption of solid-state batteries in a wide range of applications demanding high performance and safety, including electric vehicles (EVs), stationary energy storage, and even aerospace. In the long term, this technology is also anticipated to contribute to reducing manufacturing costs and simplifying production processes, thereby boosting the widespread adoption of solid-state batteries.

Source: <https://www.swri.org/press-release/swri-smu-collaborate-advance-solid-state-batteries>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#02 MDPI Review Highlights All-Solid-State Batteries' Significant Gains in Grid Storage Safety and Energy Density; Sulfide Electrolytes Achieve High Ion Conductivity but Mass Production Pegged for 2028+

Published July 20, 2026 MDPI Switzerland



OVERVIEW

A new review in MDPI underscores the transformative potential of all-solid-state batteries (ASSBs) for grid-scale energy storage, citing their ability to significantly enhance safety and energy density by replacing liquid electrolytes with solid ion conductors. Sulfide-based solid electrolytes, particularly the Li₂S-P₂S₅ system, have achieved ionic conductivities approaching $10^{-2} \text{ S cm}^{-1}$, comparable to liquid counterparts. However, despite these breakthroughs, challenges in manufacturing and cost mean mass production is not anticipated until 2028-2032. This technology is crucial for enabling high-capacity lithium metal anodes, paving the way for next-generation energy storage.

Key Findings

A recent review article published in MDPI has highlighted the groundbreaking potential of all-solid-state batteries (ASSBs) for grid-scale energy storage applications. By replacing traditional liquid electrolytes with solid ion conductors, ASSBs are poised to dramatically improve both safety and energy density, enabling high-capacity lithium metal anodes. This fundamental shift in battery architecture is critical for addressing the growing demands for robust and efficient large-scale energy storage solutions.

Technical Details

The review specifically focuses on sulfide-based solid electrolytes, such as the Li_2S - P_2S_5 system. These materials have demonstrated impressive ionic conductivities, approaching $10^{-2} \text{ S cm}^{-1}$, which is essential for achieving rapid charge and discharge rates, a critical parameter for grid applications. The use of solid electrolytes inherently mitigates issues like dendrite formation, which plague liquid-electrolyte lithium-ion batteries, thereby enhancing overall battery safety and cycle life. However, the manufacturing processes for these advanced sulfide electrolytes are complex and currently incur high costs, posing a significant hurdle for widespread adoption.

Background and Industry Context

Grid-scale energy storage is a cornerstone for integrating intermittent renewable energy sources and stabilizing power grids. Current lithium-ion technologies are reaching their performance limits and present safety concerns that hinder broader deployment in sensitive environments. ASSBs represent a paradigm shift, offering a pathway to overcome these limitations. Their potential impact extends beyond electric vehicles (EVs) to stationary storage markets, where safety, longevity, and energy density are paramount. This review provides a comprehensive overview of the progress and remaining challenges, offering a clear roadmap for ASSB commercialization.

Strategic Significance and Outlook

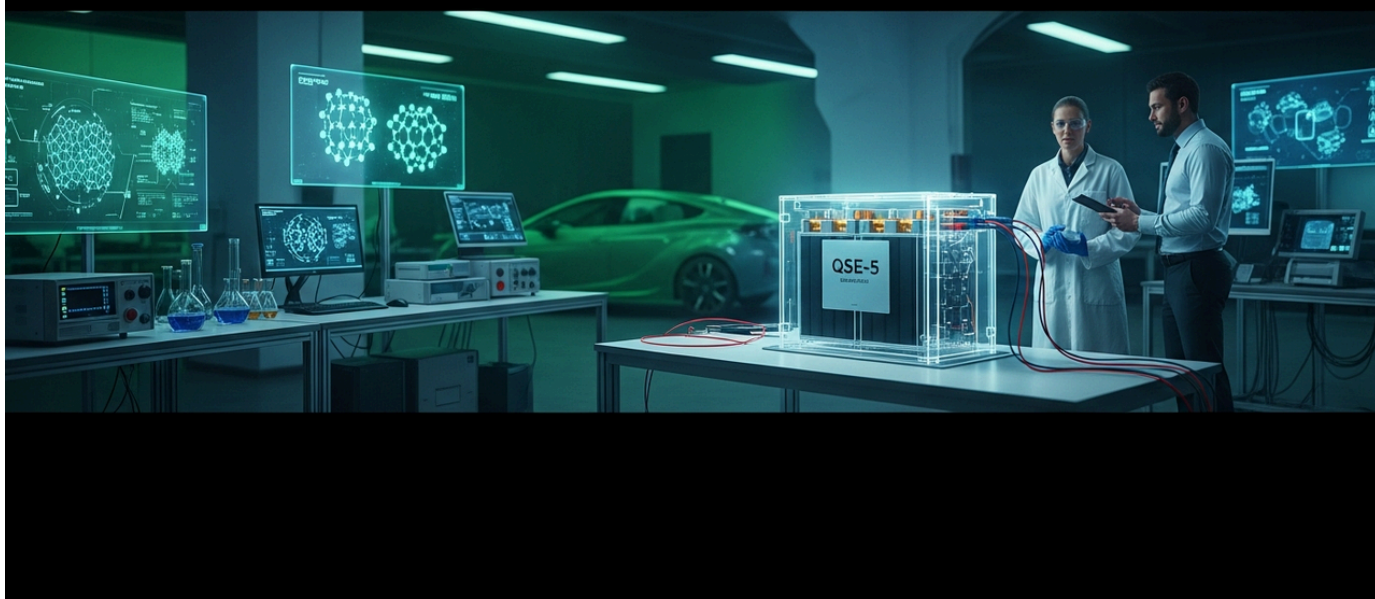
The review projects that mass production of sulfide-based solid electrolytes will not occur until 2028-2032. This timeline reflects the ongoing need for optimization in manufacturing processes and significant cost reductions. Achieving scalable and cost-effective production will be the next major milestone for ASSB technology. Once these challenges are overcome, ASSBs are expected to redefine energy storage standards, enabling more resilient and efficient power grids and accelerating the transition to a sustainable energy future.

Source: <https://www.mdpi.com/2313-0105/12/7/264>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#03 QuantumScape and Honda Partner to Accelerate QSE-5 Solid-State Lithium-Metal Battery Development, Driving Major OEM Adoption

Published July 16, 2026 XWELL USA



OVERVIEW

QuantumScape announced a joint research agreement with Honda in June 2026 to accelerate the development of the QSE-5 solid-state lithium-metal battery, signaling a significant shift from lab breakthroughs to automotive integration. Major OEMs like BMW, Samsung SDI (with Solid Power), and Stellantis (with Factorial) are actively advancing solid-state battery technology through pilot production and real-world vehicle testing. This industry-wide transition places new demands on battery pack assembly, necessitating innovations in compression, stacking, inspection, and safety testing to meet commercialization goals.

Key Findings

In 2026, solid-state battery technology has made a pivotal transition from laboratory breakthroughs to tangible automotive applications, most notably with QuantumScape's strategic joint research agreement with Honda. This partnership aims to accelerate the development of the next-generation QSE-5 solid-state lithium-metal battery for automotive use, marking a critical milestone toward commercial viability. Concurrently, Solid Power is strengthening its collaboration with BMW and Samsung SDI, while Stellantis and Factorial have initiated real-world road tests of their jointly developed Dodge Charger Daytona, underscoring an industry-wide shift from validation to commercialization.

Technical and Clinical Details

QuantumScape's QSE-5 battery is designed to deliver significantly higher energy density, enhanced safety, and faster charging capabilities compared to conventional lithium-ion batteries. The collaboration with Honda involves a rigorous joint validation process to meet the stringent performance and reliability requirements of automotive applications. Solid Power, meanwhile, is advancing its sulfide-based solid-state electrolyte technology, focusing on scaling up manufacturing through partnerships with BMW and Samsung SDI. The road tests of the Dodge Charger Daytona by Stellantis and Factorial are crucial for gathering real-world data on performance, durability, and safety under actual vehicle operating conditions, serving as a final phase before potential commercial deployment.

Background and Industry Context

Solid-state batteries are poised to address key limitations of current lithium-ion technology, including energy density, thermal runaway risks, and charging speed. As of 2026, companies are moving beyond R&D to establish pilot production lines and conduct extensive vehicle testing, making manufacturing expertise a paramount concern. Battery pack assembly, in particular, faces new challenges due to the unique cell structures and solid electrolyte properties. This necessitates innovative compression techniques, precise stacking methodologies, and stringent inspection and safety testing protocols. Overcoming these engineering hurdles is essential for the widespread market adoption of solid-state batteries.

Strategic Significance and Outlook

The intensifying collaborations between leading automotive manufacturers and battery developers are set to accelerate the commercialization roadmap for solid-state batteries. We anticipate an increase in real-world test data and further investments in mass production capabilities in the coming years. Battery pack manufacturers must swiftly adapt their infrastructure and technical capabilities to these evolving requirements, highlighting the need for coordinated efforts across the entire supply chain. The widespread adoption of solid-state batteries promises to dramatically improve electric vehicle performance, contributing significantly to a more sustainable future for mobility.

Source: <https://xwell.com/solid-state-battery-progress-2026-impact-battery-pack-assembly/>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#04 Beijing's Stationary All-Solid-State Battery Operates Stably for a Year Underground, Demonstrating Robustness in Harsh Conditions but Facing EV Integration Hurdles

Published July 18, 2026 Car News China China



OVERVIEW

A stationary all-solid-state battery system operated stably for over a year within Beijing's underground heating network, enduring extreme industrial conditions of up to 85°C and 95% humidity. Developed by Pure Lithium New Energy, this first-generation technology, also deployed in e-bike battery swap networks since 2025, proves the technology's environmental resilience. However, its adoption in EVs requires significant advancements in energy density, manufacturing costs, and long-term durability, necessitating distinct engineering solutions compared to stationary applications.

Key Findings

An energy group in Beijing successfully operated a stationary all-solid-state battery system underground within a heating network for over a year, demonstrating remarkable stability in extreme industrial conditions. This project validated the battery's robust performance at temperatures up to 85°C and 95% humidity, highlighting the high environmental tolerance of solid-state battery technology for future widespread applications. The system leverages first-generation solid-state battery technology developed by Pure Lithium New Energy.

Technical and Clinical Details

The demonstrated all-solid-state battery system was installed within the underground heating network, subjecting it to severe environmental stress. Its ability to maintain stable operation for a full year under high-temperature and high-humidity conditions, where conventional battery systems often experience performance degradation, underscores the inherent robustness and reliability of solid-state batteries. Specifically, the technology, which Pure Lithium New Energy introduced for e-bike battery swap networks in 2025, has now proven its reliability in stationary applications. However, detailed specifics on battery chemistry, energy capacity, degradation data, and cycle life performance were not disclosed.

Background and Industry Context

Solid-state batteries are anticipated to offer significant improvements over existing lithium-ion batteries in terms of safety, longevity, and potential for higher energy density, garnering interest for both EV and stationary energy storage applications. The Beijing demonstration provides crucial data affirming the viability of solid-state batteries for stationary markets, particularly in harsh environments. Yet, their application in EVs demands significantly higher energy density, reduced manufacturing costs, and guaranteed long-term durability and fast-charging capabilities that differ from stationary requirements. China's new solid-state battery standard, enacted in July 2026, sets clear definitions and requirements for technology development, including for EVs, aiming to provide a unified framework for the industry.

Strategic Significance and Outlook

While the success in stationary applications bolsters confidence in solid-state battery technology, significant challenges remain for widespread EV integration. For automotive use, these batteries must achieve substantially higher energy density and cost parity or superiority with current lithium-ion batteries. The new Chinese national standard will guide future R&D, clarifying the distinctions between true all-solid-state and hybrid solid-liquid batteries, thereby fostering healthy industry development. Moving forward, R&D efforts are expected to adopt differentiated approaches for stationary and EV markets, delivering optimal solutions tailored to specific market needs.

Source: <https://carnewschina.com/2026/07/18/solid-state-batteries-are-already-running-in-china-for-a-year-so-why-arent-they-in-evs-yet/>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#05 Toyota's Solid-State Battery Targets 745-Mile Range and Sub-10-Minute Charging for 2028 Lexus EV Debut

Published July 22, 2026 EVCUBE.NET USA



OVERVIEW

Toyota plans to debut its all-solid-state battery in luxury Lexus models by 2028, aiming for a 745-mile range and under 10-minute full recharge times. While not yet in production vehicles in 2026, the company targets commercial energy densities of 400–500 Wh/kg, approximately double that of current top-tier lithium-ion packs. Toyota is collaborating with Idemitsu Kosan and Sumitomo Metal Mining to accelerate the development of sulfide-based solid electrolytes and cathode materials to achieve these ambitious performance metrics.

Key Findings

Toyota Motor Corporation has set ambitious goals for the commercialization of its all-solid-state battery technology, planning its debut in a luxury Lexus model by 2028. This next-generation battery aims to deliver an astounding 745-mile (approximately 1,200 km) range on a single charge and achieve a full recharge in less than 10 minutes. As of 2026, while not yet in mass-produced vehicles, Toyota targets a commercial energy density of 400–500 Wh/kg, which is roughly double the performance of today's best lithium-ion battery packs.

Technical and Clinical Details

Toyota's solid-state battery is based on sulfide-based solid electrolytes. By replacing liquid electrolytes with solid materials, the technology significantly enhances battery safety and energy density. Sulfide-based solid electrolytes are particularly promising due to their high ionic conductivity and excellent stability at elevated temperatures, making them critical for improving EV performance. Toyota is pursuing strategic partnerships with Idemitsu Kosan for solid electrolyte development and Sumitomo Metal Mining for cathode materials, leveraging their material science expertise to establish mass production capabilities. These technological advancements are key to achieving the targeted high energy density and rapid charging performance. The ability of solid-state batteries to store more energy in less space, compared to conventional liquid-electrolyte batteries, will also increase design flexibility and enhance the performance of EVs.

Background and Industry Context

As the electric vehicle market expands, battery performance remains a crucial factor influencing consumer adoption. Range anxiety and long charging times are significant barriers to widespread EV ownership. Toyota's solid-state battery technology has the potential to fundamentally address these challenges, elevating EVs to a competitive level with internal combustion engine vehicles. In 2026, numerous automakers and battery manufacturers are intensely focused on solid-state battery development, but Toyota's integrated approach, from material development to vehicle integration, stands out. The planned deployment in a Lexus supercar will serve as an ideal showcase for the technology's superiority and reliability.

Strategic Significance and Outlook

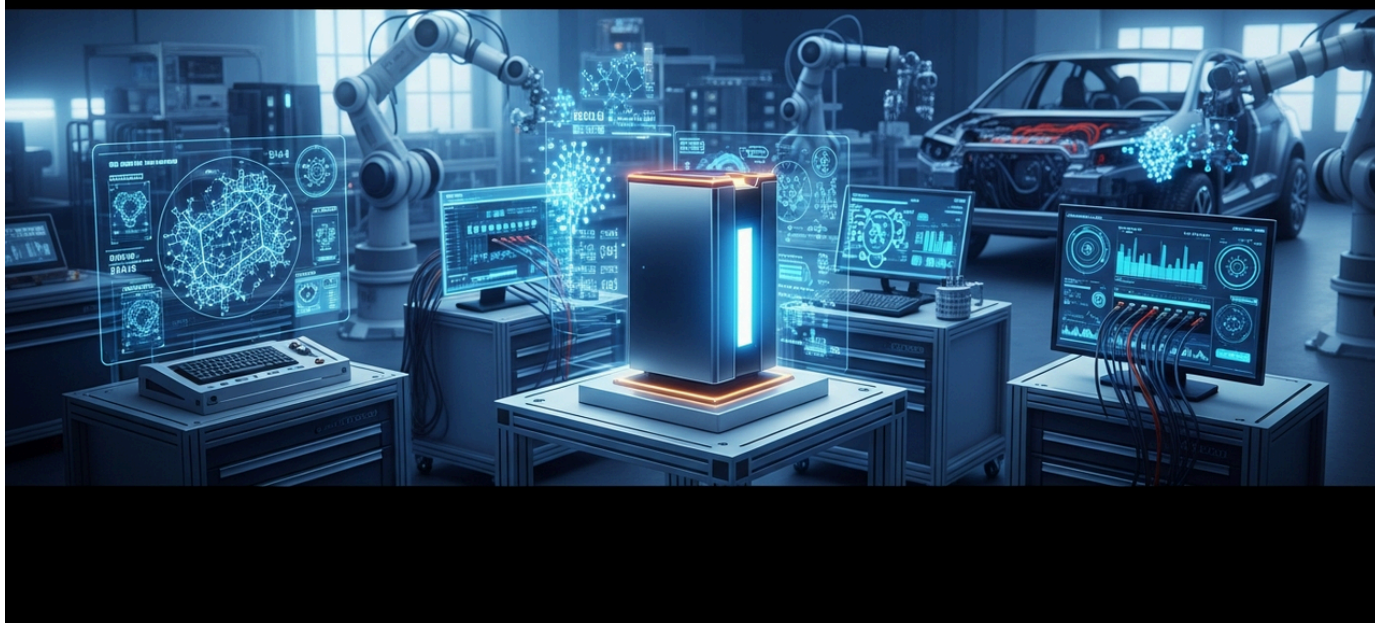
If Toyota's solid-state battery successfully enters the market by 2028, it will undoubtedly trigger a major transformation in the EV sector. This could shift consumer perceptions of EVs and accelerate their adoption significantly. The primary challenges moving forward will be establishing mass production systems and reducing costs, areas where Toyota's robust supply chain and manufacturing expertise offer a considerable advantage. Beyond automotive, this technology is also expected to have ripple effects across other sectors, including aerospace and stationary energy storage, potentially setting a new standard for next-generation energy storage solutions.

Source: <https://evcube.net/toyota-solid-state-battery-2026-everything-you-need-to-know/>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#06 Geely Unveils 400 Wh/kg Solid-State Battery, Poised to Reshape EV Market with Double Tesla's Energy Density

Published July 22, 2026 CarEdge USA



OVERVIEW

Chinese automaker Geely has announced a self-developed all-solid-state battery achieving an impressive 400 Wh/kg energy density, approximately double that of existing Tesla vehicles. Utilizing solid materials like ceramics, glass, and polymers as electrolytes, this battery significantly enhances safety by eliminating flammable liquids. Currently in final testing and nearing commercial deployment, this technology is expected to profoundly impact the competitive landscape and resale values within the EV market.

Key Findings

Chinese automotive giant Geely has reportedly achieved a breakthrough with its self-developed all-solid-state battery, boasting an impressive energy density of 400 Wh/kg. This performance is approximately double that of batteries in existing Tesla vehicles, promising substantial improvements in electric vehicle range and performance. The technology is currently in its final testing phase, with commercial deployment anticipated in the near future.

Technical and Clinical Details

Geely's solid-state battery replaces traditional liquid electrolytes with solid materials such as ceramics, glass, and polymers. This solid electrolyte approach dramatically enhances battery safety by eliminating flammable components, thereby significantly reducing the risks of thermal runaway and fire. The high energy density of 400 Wh/kg allows for smaller and lighter battery packs, increasing vehicle design flexibility and extending driving range. Furthermore, solid electrolytes contribute to an improved cycle life, ensuring long-term battery reliability. Geely emphasizes that this technology is designed to 'outlast many engines,' indicating strong confidence in its durability.

Background and Industry Context

The electric vehicle market is heavily influenced by advancements in battery technology. Current lithium-ion batteries still face limitations in range, charging time, and safety, which act as barriers to broader EV adoption. Major automakers like Geely pursuing in-house solid-state battery development and commercialization represents a crucial strategy to establish technological superiority and expand market share. Notably, achieving twice the energy density compared to leading EV manufacturers like Tesla could send significant ripples through the market. This technological leap has the potential to impact the resale value of existing EVs, especially models with shorter ranges or older battery technology.

Strategic Significance and Outlook

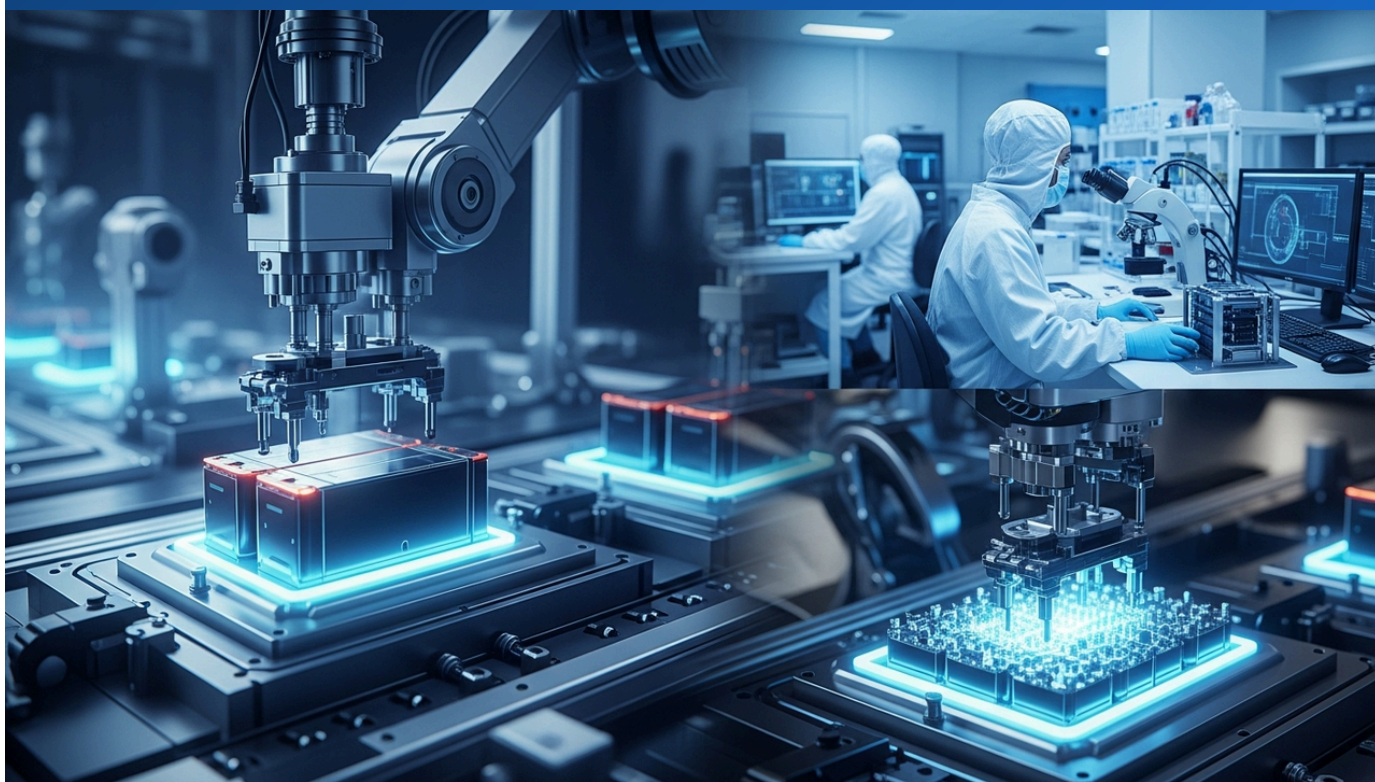
The commercial deployment of Geely's solid-state battery, once realized, will intensify competition within the electric vehicle market. This technology offers consumers new options in terms of safety and range, further enhancing the appeal of EVs. Other automakers and battery suppliers are expected to closely monitor Geely's progress and accelerate their own solid-state battery development roadmaps. In the long term, solid-state batteries have the potential to significantly improve EV performance and drive wider adoption, although challenges such as reducing mass production costs and establishing robust supply chains still remain. Geely's success will mark a significant step for China in establishing global leadership in battery technology.

Source: <https://carbuzz.com/geely-2026-solid-state-battery-crash-resale-value-of-other-electric-vehicles/>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#07 Chinese Firms Scale Hybrid Solid-Liquid Battery Production as All-Solid-State R&D Accelerates; CATL Reports 420 Wh/kg, >1500 Cycles

Published July 24, 2026 Shanghai Metals Market (SMM) China



OVERVIEW

The Shanghai Metals Market reports 2026 as the year hybrid solid-liquid batteries entered mass production, alongside accelerated R&D for all-solid-state counterparts. Chinese companies are making strides in material development and capacity expansion: Huashang Zhongke achieved high-purity Li_2S pilot success, Tinci Materials' sulfide electrolyte line is due Q3 2026, and Shin-Etsu (Xinzhoubang) began mass oxide electrolyte sales. CATL revealed impressive data for its 3rd-generation condensed solid-state battery, boasting 420 Wh/kg and over 1,500 cycles. However, SVOLT's chairman cautions that all-solid-state may struggle with cost competitiveness by 2035.

Key Findings

The year 2026 marks a significant milestone with the commencement of mass production for hybrid solid-liquid batteries in China, alongside the continued acceleration of research and development for true all-solid-state batteries. Chinese companies are demonstrating concrete progress across material production and battery manufacturing, with CATL notably reporting impressive data for its 3rd-generation condensed solid-state battery, achieving a high energy density of 420 Wh/kg and excellent durability exceeding 1,500 cycles, drawing considerable industry attention.

Technical and Clinical Details

In the materials sector, Huashang Zhongke successfully completed pilot tests for 99.95% high-purity lithium sulfide (Li_2S), and its 60-ton/year sulfide electrolyte pilot line has commenced operation. This represents a crucial step toward the stable supply of sulfide-based solid electrolytes, a core material for all-solid-state batteries. Tinci Materials is also scheduled to launch its 100-ton/year Li_2S and sulfide electrolyte pilot line in Q3 2026, further bolstering mass production capabilities. Additionally, Shin-Etsu (Xinzhoubang) has initiated mass sales of its oxide electrolytes, with plans to establish a 1,000-ton/year production capacity within 2026. CATL's 3rd-generation condensed solid-state battery showcases performance significantly surpassing existing lithium-ion batteries, particularly its high energy density and long cycle life, which are set to enhance the competitiveness of solid-state batteries in electric vehicle and other applications.

Background and Industry Context

All-solid-state battery technology is considered one of the most critical challenges for the global automotive and battery industries due to its potential to dramatically improve EV range, safety, and charging speed. Nevertheless, challenges related to manufacturing costs, mass production scalability, and long-term reliability persist. China is aggressively promoting the development and industrialization of solid-state batteries as a national strategy, with numerous companies dedicating efforts to technological innovation and capacity expansion. Conversely, opinions among experts diverge regarding the industrial positioning and timeline for semi-solid and all-solid-state batteries, as highlighted by SVOLT Energy Technology's chairman, who suggests that 'semi-solid batteries may remain mainstream in the long term, and it will be challenging for all-solid-state batteries to achieve cost advantages by 2035.' This debate encompasses multifaceted perspectives on technological maturity, manufacturability, and cost efficiency.

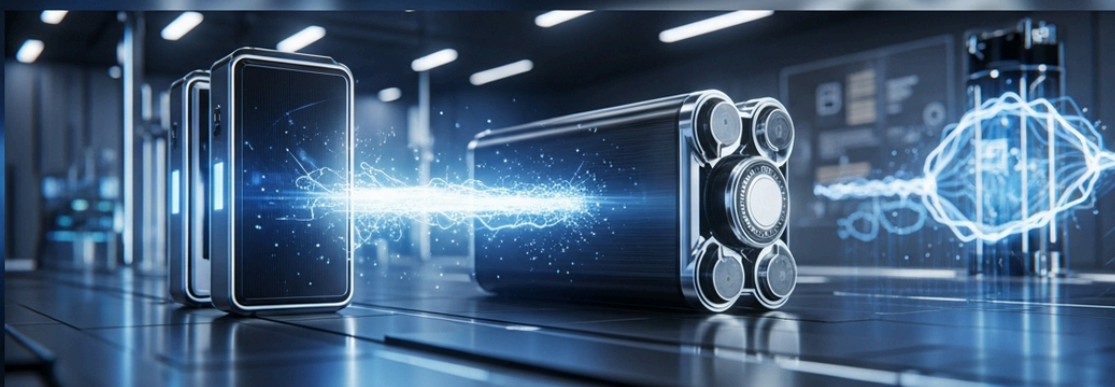
Strategic Significance and Outlook

The simultaneous mass production of hybrid solid-liquid batteries and the accelerated R&D for all-solid-state batteries indicate a multi-layered evolution within the next-generation battery market. Moving forward, further advancements in material science and the establishment of robust mass production technologies will be key to determining the cost competitiveness of solid-state batteries. The disclosure of concrete performance data by leading companies like CATL is likely to heighten expectations for solid-state battery commercialization. However, with cautious viewpoints such as that of SVOLT's chairman, technology development and market introduction are expected to progress incrementally, balancing cost and performance. Chinese enterprises are highly likely to continue playing a leading role in this sector.

Source: <https://news.metal.com/en/newscontent/104023216-solid%E2%80%90state-battery-weekly-review-hybrid-solid%E2%80%90liquid-mass-production-set-all%E2%80%90solid%E2%80%90state-rd-continues>

#08 Samsung Unveils 600-Mile Solid-State Battery, Achieving 500 Wh/kg with Enhanced Safety and Fast Charging Capabilities

Published July 20, 2026 Top Speed South Korea



OVERVIEW

Samsung's all-solid-state battery, unveiled at SNE Battery Day 2024, achieves an impressive 600-mile range and a high energy density of 500 Wh/kg, roughly doubling the performance of current EV batteries. By employing a solid electrolyte, it significantly mitigates overheating and fire risks while supporting rapid charging due to its ability to handle higher voltages and currents. This breakthrough positions it as a compelling option for next-generation electric vehicles.

Key Findings

Samsung's all-solid-state battery, introduced at SNE Battery Day 2024, represents a groundbreaking advancement in both the range and safety of electric vehicles (EVs). This battery delivers an astonishing range of up to 600 miles (approximately 965 km) and achieves an exceptionally high energy density of 500 Wh/kg. This performance level is roughly double that of high-performance EV batteries currently available on the market.

Technical and Clinical Details

Samsung's solid-state battery fundamentally eliminates the risk of overheating and fire due to thermal runaway by replacing conventional liquid electrolytes with solid materials. This dramatically enhances the safety profile of EVs. Furthermore, solid electrolytes can stably handle higher voltages and currents than liquid counterparts, leading to a substantial improvement in the battery's fast-charging capabilities. The 500 Wh/kg energy density allows for smaller and lighter battery packs, which in turn increases vehicle design flexibility and improves driving performance through optimized weight distribution. This performance was achieved through research focused on optimizing silver-carbon composite anodes and solid electrolytes.

Background and Industry Context

Key factors hindering the widespread adoption of electric vehicles include range anxiety, long charging times, and safety concerns related to batteries. Samsung's solid-state battery is positioned as a comprehensive solution addressing all these challenges. Critically, the elimination of fire risks associated with liquid-electrolyte batteries will significantly boost consumer confidence in EVs. The automotive industry as a whole is seeking higher-performance and safer battery technologies, and concrete achievements announced by major players like Samsung elevate expectations for the practical implementation of solid-state batteries.

Strategic Significance and Outlook

Samsung's solid-state battery technology holds the potential to bring about a major transformation in the next-generation EV market. A 600-mile range coupled with fast-charging capabilities will drastically improve the convenience of daily EV use, bolstering their competitiveness against gasoline-powered vehicles. Future challenges will focus on cost-effectively mass-producing these high-performance batteries and establishing automotive-grade durability and reliability. Should Samsung's technology be fully commercialized, competition in the EV battery market will intensify, prompting other battery manufacturers and automakers to accelerate their pursuit of similarly high-performance solutions. This will further accelerate EV adoption and provide a powerful impetus toward a sustainable mobility future.

Source: <https://www.topspeed.com/the-samsung-600-mile-solid-state-battery/>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#09 Next-Gen Battery Material Startup Sila Secures \$300M to Expand Washington State Plant, Elevating Energy Density with Silicon-Carbon Anodes

Published July 21, 2026 GeekWire USA



OVERVIEW

Next-gen battery materials startup Sila announced a \$300 million funding round to expand its manufacturing plant in Washington state. With prior funding exceeding \$1.3 billion and a valuation of approximately \$2 billion, Sila develops silicon-carbon composite materials that replace traditional graphite in lithium-ion battery anodes. This innovation enhances energy capacity by up to 20% and accelerates charging speeds, driving higher-performance batteries for EVs and consumer electronics.

Key Findings

Sila, a pioneering startup in next-generation battery materials, announced the completion of a \$300 million funding round aimed at expanding its advanced manufacturing facility in Moses Lake, Washington. These funds will be instrumental in scaling up production of Sila's innovative silicon-carbon anode materials, addressing the growing demand in the electric vehicle (EV) and consumer electronics markets.

Technical and Clinical Details

Sila's core innovation lies in its silicon-carbon composite material, designed to replace graphite traditionally used in lithium-ion battery anodes. Silicon theoretically boasts an approximate 10-fold greater capacity for lithium-ion storage compared to graphite. By integrating this material, Sila can significantly boost battery energy density. The company's technology is reported to increase energy capacity by up to 20% over existing lithium-ion batteries and also accelerate charging speeds. This silicon-carbon anode material pushes the performance limits of lithium-ion batteries, contributing to extended EV ranges and longer battery life for mobile devices like smartphones.

Background and Industry Context

The rapid proliferation and performance demands of electric vehicles are driving an escalating need for higher battery energy density and faster charging capabilities. Material technology startups like Sila are at the forefront of fundamental battery performance improvements, with their innovations shaping the competitiveness of the entire industry. Sila has raised over \$1.3 billion to date and, with a valuation of approximately \$2 billion, stands as a prominent unicorn in the next-generation battery materials market. This latest funding round demonstrates investor confidence in the company's manufacturing scale-up potential, highlighting the growing expectation for material breakthroughs as existing battery technologies approach saturation.

Strategic Significance and Outlook

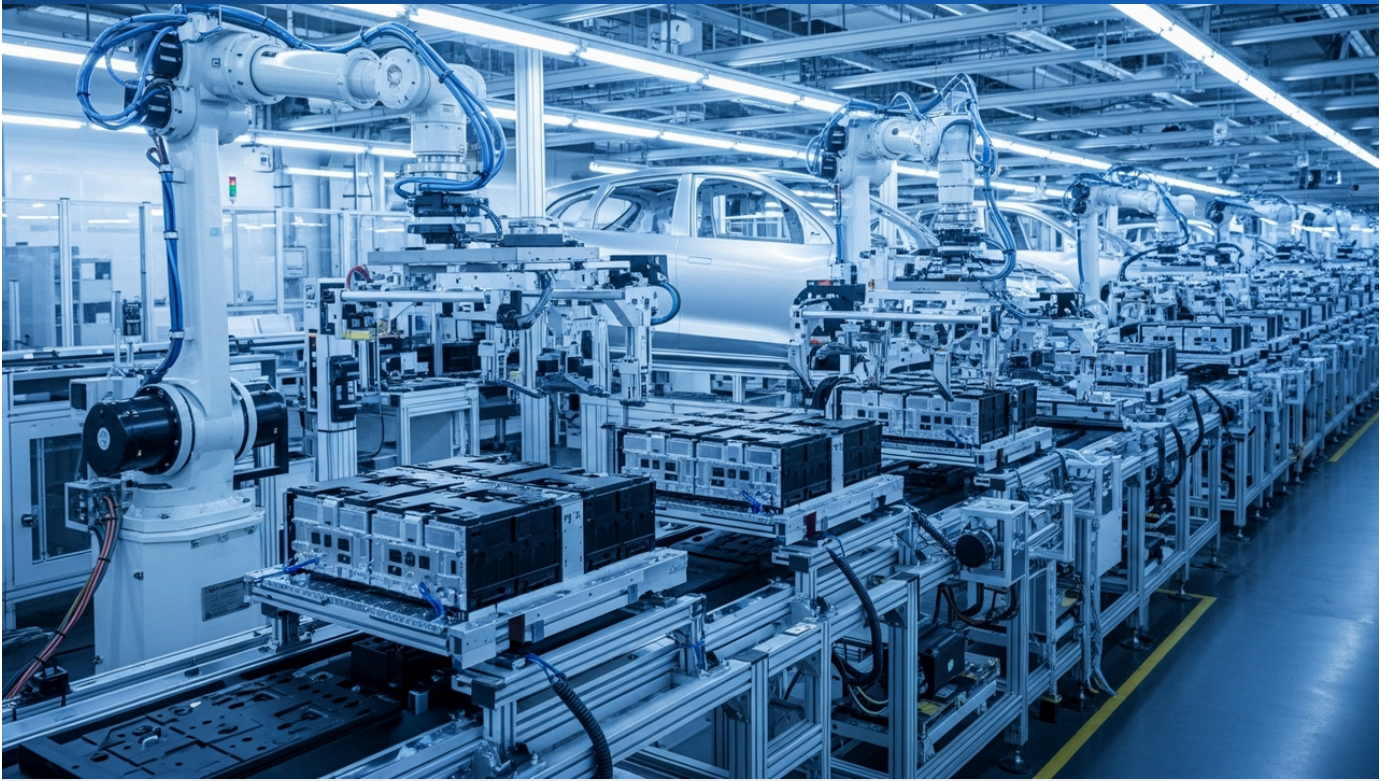
With this \$300 million investment, Sila will accelerate the expansion of its Moses Lake plant, reinforcing its supply chain for high-performance silicon-carbon anode materials. This move could hasten the market introduction of EVs and consumer electronics powered by Sila's technology. The company's approach offers an alternative pathway to battery performance enhancement, distinct from all-solid-state battery development, ensuring that the broader EV industry benefits from a diverse range of evolving battery technologies. Moving forward, Sila's materials are expected to be adopted by a wider array of battery manufacturers and automakers, setting new standards for electric vehicle range and performance.

Source: <https://www.geekwire.com/2026/next-gen-battery-startup-sila-raises-300m-to-expand-washington-state-manufacturing-plant/>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#10 China Enacts World's First National Standard for Vehicle Solid-State Batteries, 'GB/T 43568-2026', Ending Industry Ambiguity

Published July 16, 2026 (情報元なし、記事内容より判断) China



OVERVIEW

Effective July 1, 2026, China's 'GB/T 43568-2026' marks the world's inaugural national standard for vehicle solid-state batteries, decisively clarifying industry definitions. It mandates a liquid electrolyte weight loss of 0.5% or less for true solid-state chemistries and sets a minimum 400 Wh/kg energy density for hybrid solid-liquid versions. This standard aims to end market confusion, establish unified safety and performance benchmarks, and accelerate the reliable development of advanced battery technologies.

Background and Industry Context

Solid-state batteries are widely hailed as the next generation of energy storage, promising significant advantages over conventional lithium-ion batteries, including vastly higher energy density, enhanced safety, and extended lifespan. Yet, the rapid pace of technological development has also led to a confusing proliferation of terms such as 'semi-solid,' 'quasi-solid,' and 'all-solid-state,' creating considerable ambiguity for market participants and consumers alike. Notably, some products marketed as 'all-solid-state batteries' have been found to contain trace amounts of liquid electrolyte, essentially functioning as 'hybrid solid-liquid batteries' and potentially misleading consumers. With the implementation of this new national standard, the Chinese government aims to unequivocally resolve this conceptual confusion, bolster technological credibility, and foster greater transparency across the industry.

Key Provisions of GB/T 43568-2026

Effective July 1, 2026, China officially enacted 'GB/T 43568-2026,' establishing the world's first national standard specifically for vehicle solid-state batteries. This landmark regulation is designed to definitively clarify the definition of 'solid-state batteries' in the market and provide clear guidelines for technological development. Key stipulations include a stringent liquid electrolyte weight loss threshold of 0.5% or less for batteries to be certified as true solid-state, alongside a mandated energy density of at least 400 Wh/kg for hybrid solid-liquid battery configurations.

Technical Specifications and Market Impact

At the heart of 'GB/T 43568-2026' lies its quantifiable definition of the fundamental characteristic of solid-state batteries: the near-complete 'elimination of liquid electrolytes.' By setting a precise liquid electrolyte weight loss threshold of 0.5% or less, the standard ensures that only batteries with negligible liquid content can be certified as 'all-solid-state.' For hybrid solid-liquid batteries, a class currently making significant strides toward commercialization, the standard mandates a minimum energy density of 400 Wh/kg. This dual approach encourages high-performance development while rigorously upholding safety standards. Ultimately, this framework provides a unified evaluation basis for battery safety, performance, and durability, fostering a common language and clear expectations between battery suppliers and vehicle manufacturers.

Strategic Significance and Global Outlook

The enactment of this national standard is poised to have a profound and far-reaching impact, not just within China's domestic market but across the entire global landscape of solid-state battery development. By establishing unambiguous definitions and performance benchmarks, research institutions and companies worldwide can now pursue more precise developmental goals, which is expected to significantly accelerate the advancement of truly solid-state battery technologies. Furthermore, consumers will benefit from more reliable product information, enabling informed purchasing decisions and fostering healthier market competition. In the long term, 'GB/T 43568-2026' is anticipated to influence international standardization dialogues, playing a pivotal role in shaping the future trajectory of battery technology across the global automotive and energy storage industries.

Source: <https://www.sdle.co.il/wp-content/uploads/2026/05/solid-std.pdf>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#11 Sumitomo Chemical Begins Mass Production Preparations for Halide-Based Solid Electrolyte for EVs, Targeting Cost-Effective Sulfide-Equivalent Performance with Existing Lines

Published July 21, 2026 Just Auto Japan



OVERVIEW

Sumitomo Chemical is reportedly initiating preparations for mass production of halide-based solid electrolytes for EV all-solid-state batteries. Jointly developed with Kyoto and Tottori Universities, this material promises performance comparable to high-ion-conductive sulfide-based electrolytes but at a lower manufacturing cost. Critically, its compatibility with existing lithium-ion battery production lines is expected to significantly reduce manufacturing expenses and capital investment, thereby accelerating the adoption of all-solid-state batteries.

Key Findings

Sumitomo Chemical, a leading Japanese chemical manufacturer, has officially commenced preparations for the mass production of halide-based solid electrolytes, a core material for all-solid-state batteries in electric vehicles (EVs). This innovative material is a result of collaborative research with Kyoto and Tottori Universities, holding the potential to deliver performance comparable to highly ion-conductive sulfide-based solid electrolytes but through a more economical manufacturing process.

Technical and Clinical Details

Halide-based solid electrolytes offer advantages over sulfide-based counterparts, including higher air stability and relatively simpler synthesis processes. Sumitomo Chemical is reported to have established technology that enables this material to achieve ionic conductivity equivalent to or superior to sulfide systems, while simultaneously reducing manufacturing costs. Particularly noteworthy is the high probability that this new electrolyte can leverage portions of existing lithium-ion battery production lines. This capability would mitigate the need for massive new investments in solid-state battery manufacturing equipment, allowing for a swift and efficient transition to mass production. This characteristic is vitally important for enhancing the cost competitiveness of solid-state batteries and accelerating their widespread adoption in the EV market.

Background and Industry Context

All-solid-state batteries are anticipated as next-generation batteries that could fundamentally solve current lithium-ion battery challenges, such as safety (thermal runaway risk), energy density, and charging speed. However, their practical realization hinges on the development of high-performance solid electrolytes and the technology to mass-produce them at low cost. While sulfide-based solid electrolytes are known for high ionic conductivity, they have faced challenges regarding air instability and expensive manufacturing. Sumitomo Chemical's halide-based solid electrolyte is highly regarded within the industry as a solution that overcomes these issues, offering a more realistic pathway to commercialization. The success of this industry-academia collaboration with Japanese universities also highlights Japan's strengths in material science.

Strategic Significance and Outlook

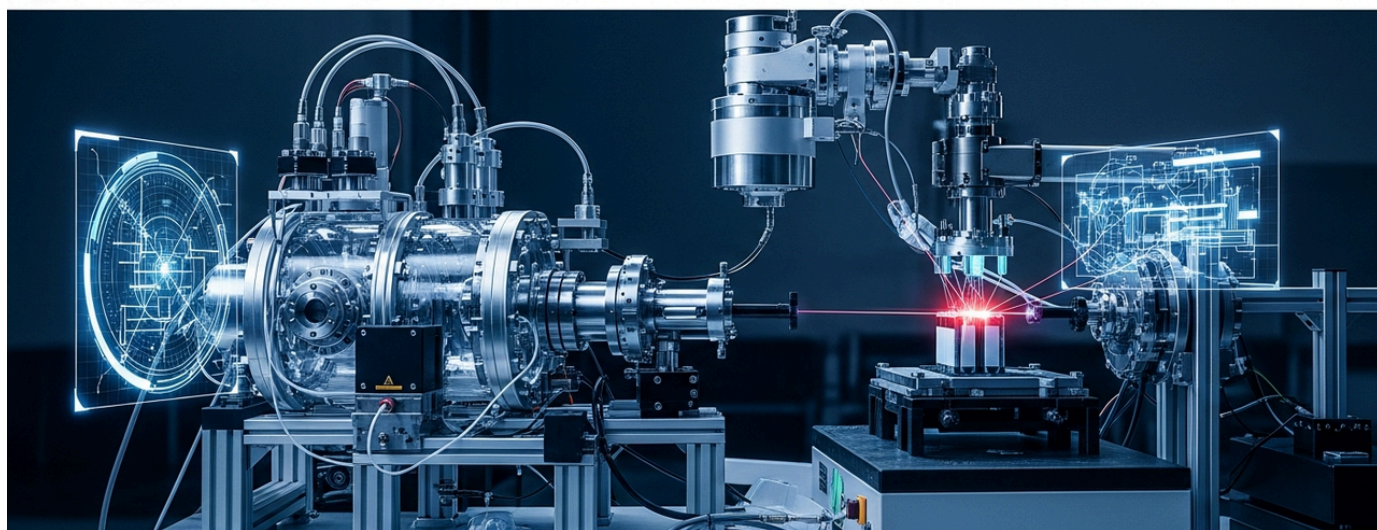
Sumitomo Chemical's preparations for mass production of halide-based solid electrolytes represent a critical step in the commercialization of all-solid-state batteries. The potential to utilize existing production lines offers significant advantages in terms of capital expenditure, directly contributing to improved price competitiveness for EVs equipped with solid-state batteries. Moving forward, the company is expected to strengthen collaborations with automakers and battery manufacturers to establish its supply chain. Widespread adoption of this technology would enhance EV safety and performance, accelerate further EV penetration, and contribute to Japan's global leadership in next-generation battery materials.

Source: <https://www.just-auto.com/news/sumitomo-chemical-halide-ev-battery-electrolyte/>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#12 In-Situ DEMS Accelerates Solid-State and Hybrid Battery Safety Validation: Real-time Evaluation of Electrode-Electrolyte Interface Stability

Published July 23, 2026 AZoCleantech Unknown



OVERVIEW

Leveraging In-situ DEMS (Differential Electrochemical Mass Spectrometry) significantly accelerates safety validation for all-solid-state and hybrid batteries. Research utilizing DS-SPE systems confirmed a complete absence of CO₂ and O₂ evolution during battery cycling, indicating highly stable operation with low thermal runaway risk. This real-time analytical technique provides precise evaluation of electrode-solid electrolyte interface stability, offering critical insights essential for developing safer, high-performance next-generation batteries.

Key Findings

The integration of In-situ DEMS (Differential Electrochemical Mass Spectrometry) technology has dramatically accelerated the safety validation processes for both all-solid-state and hybrid batteries. This advanced analytical method enables high-precision, real-time measurement of gas species and quantities evolved during battery charge-discharge cycles. Specifically, evaluations using DS-SPE (Dual Solid-State Polymer Electrolyte) systems have confirmed a complete absence of CO₂ and O₂ evolution, a critical finding that suggests extremely stable battery operation with minimal thermal runaway risk.

Technical and Clinical Details

In-situ DEMS directly couples an electrochemical cell with a mass spectrometer, allowing for on-the-spot analysis of trace gases generated at the electrode-electrolyte interface during battery operation. This capability enables real-time identification of reaction gas production under specific voltage or current conditions, which was previously unattainable with conventional off-line analysis. For all-solid-state/hybrid batteries, such as DS-SPE systems, the generation of volatile gases from liquid electrolytes has been a significant safety concern. However, detailed DEMS analysis has clearly demonstrated zero evolution of major thermal runaway-related gases like CO₂ and O₂ during cycling. This result scientifically substantiates the inherently high safety of these batteries. DEMS also contributes to elucidating changes in interfacial resistance and mechanisms of side reactions, aiding in identifying causes of battery degradation and formulating improvement strategies.

Background and Industry Context

With the widespread adoption of electric vehicles (EVs) and large-scale stationary energy storage systems, battery safety is becoming an increasingly critical issue. All-solid-state and hybrid batteries, in particular, are expected to offer superior safety compared to traditional lithium-ion batteries that use liquid electrolytes, necessitating high-precision tools for objective performance and safety evaluation. In-situ DEMS was developed to meet this need, providing the capability to nondestructively analyze battery internal behavior in detail. This technology is key to improving efficiency and reliability in material selection, cell design, and manufacturing process optimization during the research and development phase.

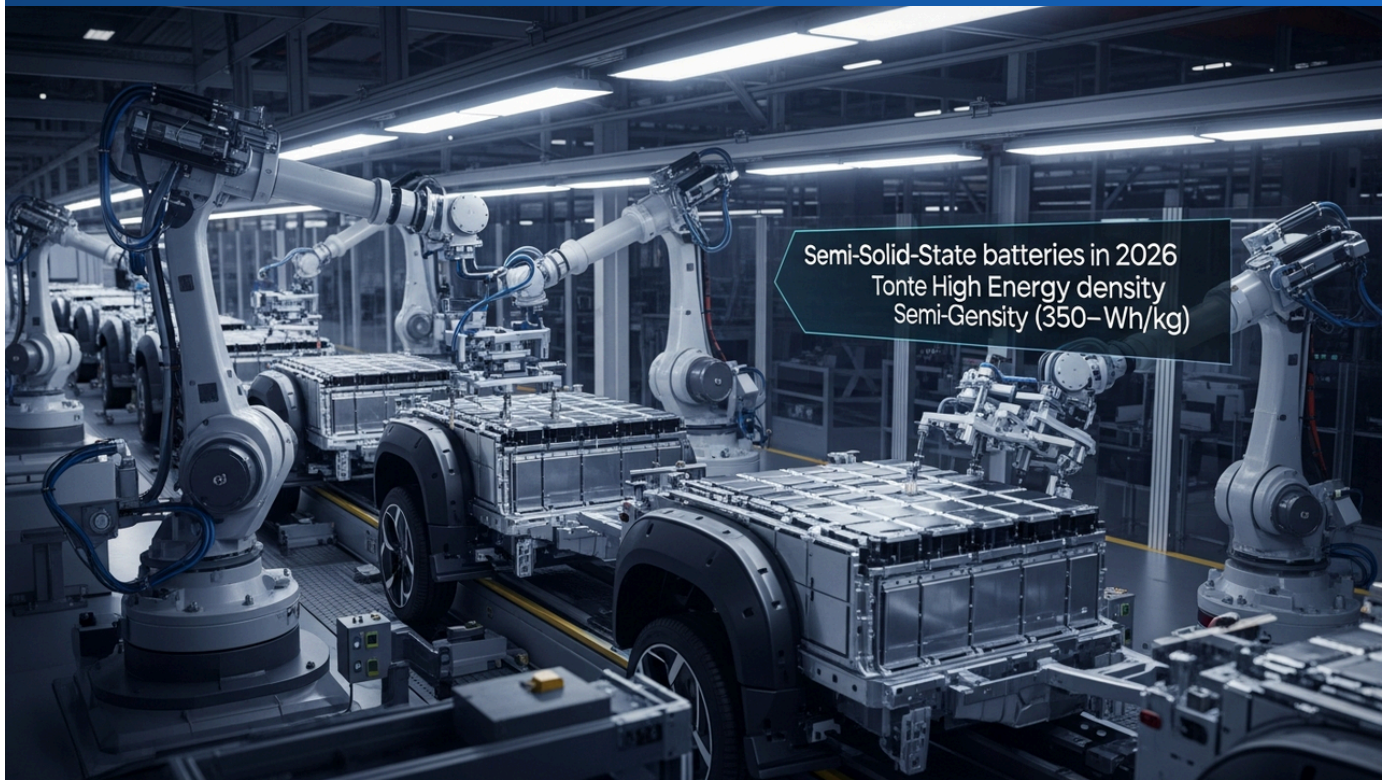
Strategic Significance and Outlook

The continued proliferation and evolution of In-situ DEMS technology will accelerate the development of safer, longer-lasting next-generation batteries. Real-time gas evolution monitoring will become a powerful tool for rapidly assessing the safety of new electrolyte and electrode materials, contributing to reduced development times. In the future, this technology is expected to be applied to quality control and safety checks on production lines, further enhancing the reliability of all-solid-state and hybrid batteries. This will drive innovation in battery technology across a wide range of sectors, including electric vehicles, renewable energy storage, and portable electronic devices, contributing to the realization of a sustainable society.

Source: <https://www.azocleantech.com/article.aspx?ArticleID=2178>

#13 Mass Production of Semi-Solid Batteries Escalates in 2026: NIO ET9, MG4 Adopt 350-400 Wh/kg Packs, Leveraging Existing Production Lines for Cost Control

Published July 24, 2026 钛媒体官方网站 China



OVERVIEW

The year 2026 marks a significant commercial rollout for semi-solid (hybrid liquid-solid) batteries, with leading EV models like the NIO ET9, MG4, and GAC Hyper adopting packs delivering 350-400 Wh/kg. This next-generation battery technology boasts over 90% compatibility with existing liquid battery production lines, critically reducing retooling costs and enabling rapid, cost-effective market deployment.

Background

While the promise of all-solid-state batteries holds significant appeal for next-generation electric vehicles (EVs), their challenges in mass production technology, cost-efficiency, and long-term reliability remain substantial hurdles, suggesting a significant lead time before widespread commercialization. In this transitional period, semi-solid batteries have emerged as a pragmatic and effective bridging technology. China has rapidly established itself as a global leader in both EV manufacturing and battery innovation, with numerous domestic companies actively championing the commercialization of semi-solid battery solutions. This strategic push is poised to deliver higher-performance, safer EVs to consumers at more accessible price points, thereby accelerating the overall growth trajectory of the global EV market. Furthermore, the technological advancements and operational insights gained from scaling semi-solid battery production are expected to directly inform and accelerate the future development of full all-solid-state battery technologies.

Key Findings

The year 2026 is a pivotal moment for the full-scale commercial deployment of semi-solid (hybrid liquid-solid) batteries within the EV sector. Major Chinese EV manufacturers, including NIO (with its ET9 model), MG (MG4), GAC (Hyper series), and Chery, are progressively introducing models equipped with these advanced battery packs. These semi-solid designs are achieving remarkable energy densities of 350–400 Wh/kg, comparable to or surpassing the performance of existing high-end lithium-ion batteries, which promises substantially extended driving ranges for electric vehicles.

Technically, semi-solid batteries incorporate gel-like or polymer-based solid electrolytes with a carefully controlled, small percentage of liquid electrolyte. This hybrid composition significantly enhances both safety and energy density compared to conventional liquid-electrolyte batteries. The inherent mechanical strength contributed by the solid electrolyte component improves overall battery structural stability, notably mitigating the risk of thermal runaway events. A crucial economic advantage of this semi-solid technology is its high compatibility, leveraging over 90% of existing liquid battery production lines. This allows for integration without extensive modifications to current manufacturing facilities, thus dramatically suppressing new capital investment, containing production cost increases, and accelerating time-to-market. This combination of enhanced performance, improved safety, and cost-effective, rapid deployment makes semi-solid batteries an exceptionally attractive option for a growing number of automakers and positions them as a critical 'bridge' technology until true all-solid-state batteries are ready for mass market adoption.

Source: <https://www.tmtpost.com/8078054.html>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#14 SwRI and SMU Forge Joint Research in Solid-State Battery Interface Engineering: Ultra-Thin Film Formation to Suppress Dendrites and Extend Lifespan

Published July 20, 2026 R&D World USA



OVERVIEW

Researchers from Southwest Research Institute (SwRI) and Southern Methodist University (SMU) have launched a collaborative project to address the unstable interface between lithium metal anodes and solid electrolytes in all-solid-state batteries. They plan to form ultra-thin films, tens to hundreds of nanometers thick, on lithium metal anodes and meticulously measure how their chemical properties influence lithium nucleation and long-term electrochemical performance. This research aims to develop a breakthrough method for suppressing dendrite formation and extending the lifespan of solid-state batteries.

Key Findings

Researchers at the Southwest Research Institute (SwRI) and Southern Methodist University (SMU) have initiated a collaborative project aimed at significantly enhancing the performance and safety of all-solid-state batteries. This endeavor focuses on one of the primary challenges in solid-state battery technology: the unstable interface between the lithium metal anode and the solid electrolyte. Their objective is to develop ultra-thin, nanometer-scale films on the lithium metal anode and meticulously elucidate how their precise chemical properties impact the battery's long-term performance.

Technical and Clinical Details

Central to this joint project is the technology for forming extremely thin films, ranging from tens to hundreds of nanometers thick, on the surface of the lithium metal anode. Researchers will perform detailed measurements and analyses of how the chemical composition, structure, and physical properties of these thin films influence lithium ion deposition behavior (nucleation). Specifically, by combining in-situ spectroscopic analysis, electron microscopy, and electrochemical measurements, they aim to uncover the mechanisms by which lithium deposits uniformly on the anode, thereby suppressing the formation of dendrites (tree-like structures). Dendrite formation is a major cause of internal short circuits and reduced battery life, making its suppression critically important for the practical realization of all-solid-state batteries.

Background and Industry Context

All-solid-state batteries are anticipated as a next-generation technology poised to overcome the limitations of conventional liquid-electrolyte lithium-ion batteries, particularly concerning safety (thermal runaway risk) and energy density. However, the adoption of lithium metal anodes, while enabling high energy density, faces severe challenges such as high interfacial resistance and dendrite formation at the interface with solid electrolytes. The stability of this interface is the key determinant of solid-state battery performance and lifespan. The collaboration between SwRI and SMU bridges fundamental scientific research with applied technological development, integrating expertise from material science, electrochemistry, and nanotechnology to fundamentally solve this complex interfacial problem.

Strategic Significance and Outlook

The success of this joint research could represent a significant breakthrough towards the commercialization of all-solid-state batteries. By effectively suppressing dendrite formation and establishing stable interfaces, the cycle life and safety of solid-state batteries would be substantially improved, accelerating their application across a wide range of sectors including electric vehicles (EVs), aerospace, and stationary energy storage systems. Moving forward, based on these research outcomes, it is expected that commercial mass production technologies will be developed, leading to the market introduction of high-performance and reliable all-solid-state batteries. This has the potential to establish new standards for next-generation energy storage technology and significantly contribute to the realization of a sustainable society.

Source: <https://www.rdworldonline.com/swri-and-smu-join-push-to-engineer-solid-state-battery-interfaces/>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#15 Stellantis Plans 2026 Demonstration Fleet of EVs Powered by Factorial Energy's Solid-State Batteries

Published July 16, 2026 Benchmark Minerals Intelligence USA



OVERVIEW

Automotive giant Stellantis announced plans to deploy a demonstration fleet of electric vehicles (EVs) powered by Factorial Energy's all-solid-state batteries in 2026. Factorial Energy, a U.S. company, develops unique solid-state battery technology combining a lithium-metal anode with a polymer-based solid-state electrolyte, having initiated formal automotive qualification last year. This initiative underscores Stellantis' commitment to commercializing solid-state technology and represents a significant step for Factorial's market deployment.

Key Findings

Stellantis, a global automotive manufacturer, has unveiled plans to deploy a demonstration fleet of electric vehicles (EVs) equipped with all-solid-state batteries developed by U.S.-based next-generation battery company Factorial Energy, within 2026. This announcement marks a critical milestone, indicating that the commercialization of solid-state battery technology in the automotive industry is becoming a tangible reality.

Technical and Clinical Details

Factorial Energy develops proprietary all-solid-state battery technology that integrates a lithium-metal anode with a polymer-based solid-state electrolyte, known as 'FEST™ (Factorial Electrolyte System Technology).' This technology offers higher energy density, superior safety, and a wider operating temperature range compared to conventional liquid-electrolyte lithium-ion batteries. Notably, polymer-based solid electrolytes have the advantage of being relatively easier to manufacture and may offer high compatibility with existing lithium-ion battery production infrastructure. Factorial commenced the formal automotive qualification process for its technology late last year, and the partnership with Stellantis is seen as the final phase toward its practical implementation and mass production. The demonstration fleet will be crucial for collecting valuable data on battery performance, durability, and safety under real-world driving conditions.

Background and Industry Context

As the automotive industry accelerates its shift towards electrification, there is an intense demand for next-generation battery technologies that can improve key EV performance metrics such as range, charging time, and safety. All-solid-state batteries are considered the most promising candidates to fundamentally address these challenges, attracting substantial investments from numerous automakers and battery companies. Stellantis has been a strategic investor in Factorial Energy, supporting its technological development. The plan to deploy a demonstration fleet is not merely a progress report on R&D but rather signals that all-solid-state batteries are entering the practical application phase, with the potential to be integrated into consumer EVs in the near future.

Strategic Significance and Outlook

The deployment of Stellantis' EV demonstration fleet with Factorial Energy's solid-state batteries is expected to intensify competition in the EV market. This move could also prompt other automakers to accelerate their own solid-state battery technology development and adoption. Data obtained from the demonstration fleet will be indispensable for further refining Factorial's technology and making final adjustments for mass production. In the long term, this partnership is expected to lead to the adoption of Factorial's solid-state batteries across Stellantis' broad EV lineup, dramatically enhancing the performance and market competitiveness of electric vehicles. This marks a significant step for the global automotive industry towards achieving a sustainable mobility future.

Source: <https://source.benchmarkminerals.com/article/stellantis-targets-2026-for-solid-state-battery-ev-using-factorial-energys-technology>

Collected: July 24, 2026 | Automated Research System (Gemini API)

#16 Tohoku University Discovers Optimal Lithium Concentration for Lithium Metal Batteries: New Guidelines for Dendrite Suppression and Enhanced Safety

Published July 16, 2026 EurekAlert! Japan



OVERVIEW

Researchers at Tohoku University have identified an optimal lithium salt concentration in electrolytes that significantly extends the lifespan and enhances the safety of lithium metal batteries. Their study reveals a 'sweet spot' where lithium deposits uniformly, forming a more robust protective layer, rather than simply increasing concentration. This groundbreaking discovery provides new design principles and concrete guidelines for practical lithium metal battery development by suppressing dendrite formation, preventing internal shorts, and mitigating performance degradation.

Key Findings

A research team at Tohoku University has announced a significant discovery poised to dramatically improve the lifespan and safety of lithium metal batteries, a highly anticipated next-generation battery technology. They pinpointed a 'sweet spot' for lithium salt concentration within the electrolyte, demonstrating that using this optimal concentration enables uniform lithium metal deposition on the anode surface, effectively suppressing the formation of dendrites (tree-like crystals). This achievement presents a new design principle crucial for the practical implementation of lithium metal batteries.

Technical and Clinical Details

Lithium metal batteries theoretically promise much higher energy densities than current lithium-ion batteries. However, a major challenge has been the formation of dendrites on the lithium metal anode surface during repeated charge-discharge cycles, which can lead to internal shorts, electrolyte depletion, reduced battery life, and even fire. Tohoku University's research re-evaluated the conventional wisdom that simply increasing lithium salt concentration was sufficient, instead discovering that lithium deposits most ideally within a specific concentration range. At this 'optimal concentration,' lithium ion transport occurs efficiently and uniformly, forming a dense, stable SEI (Solid Electrolyte Interphase) layer on the anode surface. This stable SEI layer was demonstrated to physically and chemically inhibit dendrite growth, significantly enhancing battery cycle stability and safety.

Background and Industry Context

High-energy-density and safe batteries are essential for improving the performance of electric vehicles (EVs) and portable electronic devices. Lithium metal batteries are among the most promising candidates for next-generation batteries, but the dendrite issue has been a long-standing problem. Many research institutions and companies are exploring various approaches to suppress dendrites (e.g., solid electrolytes, artificial SEI layers, electrolyte additives). Tohoku University's research, which focuses on electrolyte composition, specifically lithium salt concentration, to identify optimal conditions, holds the potential to solve this fundamental problem with a relatively simple method. This represents critical insight for enhancing battery performance from a materials design perspective and is readily applicable to existing electrolyte systems, suggesting a lower barrier to practical implementation.

Strategic Significance and Outlook

Tohoku University's research findings hold immense significance for accelerating the commercialization of lithium metal batteries. The discovery of the optimal lithium salt concentration enables the design of safer and longer-lasting lithium metal batteries, promising benefits across various sectors, including extended EV ranges and improved smartphone battery life. Moving forward, based on this new design principle, further development of more stable electrolyte compositions and optimization for battery mass production are anticipated. Widespread adoption of this technology is expected to accelerate the proliferation of next-generation batteries, contributing significantly to the realization of a sustainable energy society.

Source: <https://www.eurekalert.org/news-releases/1136534>

#17 KnowMade Reports Q2 2026 Solid-State Li-ion Battery Patent Trends: CATL, Gotion, POSCO, Chery Accelerate IP Activities

Published July 22, 2026 KnowMade France



OVERVIEW

Patent analysis firm KnowMade announced updated trends in solid-state lithium-ion battery intellectual property (IP) for Q2 2026. Over 2,250 new patent families were published this quarter, as leading IP players continue to strengthen their portfolios. Notably, companies like CATL, Gotion, POSCO, and Chery Automobile significantly increased their patent filing activity compared to the Q2 2025 average, signaling intensifying competition in solid-state battery technology.

Key Findings

KnowMade, a specialist in patent analysis, has released an updated report on intellectual property (IP) trends in the all-solid-state lithium-ion battery sector for Q2 2026.

According to this report, over 2,250 new patent families were published worldwide during the quarter, indicating a surge in research, development, and protection activities related to solid-state battery technology. Notably, key players such as China's CATL and Gotion, South Korea's POSCO, and China's Chery Automobile have substantially increased their patent filing activities compared to their average in Q2 2025.

Technical and Clinical Details

KnowMade's analysis focuses on innovative technologies across key components of solid-state batteries, including solid electrolyte materials (sulfide, oxide, polymer-based), electrode materials, cell structures, manufacturing processes, and safety aspects. Many new patents aim to improve performance, reduce costs, and establish mass production techniques in these areas. For instance, the intensified patenting by CATL and Gotion suggests their ambition to establish a leading role in the next-generation solid-state battery market. POSCO's activities are likely concentrated on strengthening IP in material supply, especially for cathode, anode, and electrolyte materials. Furthermore, the increase in patent activities by automaker Chery Automobile reflects its accelerated technological development to integrate solid-state batteries into its EV lineup.

Background and Industry Context

All-solid-state batteries are anticipated as the ultimate battery technology to solve the challenges associated with existing lithium-ion batteries (safety, energy density, charging speed). Companies and research institutions worldwide are engaged in fierce development competition. The surge in patenting activity is a critical strategy for companies to secure technological advantages and establish future market competitiveness. The fact that Chinese and South Korean companies, in particular, are strengthening their IP activities indicates their aspiration for global leadership in the battery technology sector. The publication of over 2,250 new patent families underscores the rapid pace and scale of technological innovation in this field.

Strategic Significance and Outlook

The acceleration of patenting activity in all-solid-state lithium-ion batteries suggests that this technology will mature further and advance towards commercialization in the coming years. As major players strengthen their IP portfolios, technological competition will intensify, driving further innovation. Analysis of patent information serves as a crucial indicator for investors and researchers to identify technological leaders and hot spots within specific technical domains. Ultimately, these patents are expected to materialize into practical products, establishing new standards for battery technology in electric vehicles, renewable energy storage, and other high-performance applications.

Source: <https://www.knowmade.com/technology-news/press-release/li-ion-solid-battery-patenting-accelerates-in-q2-2026/>

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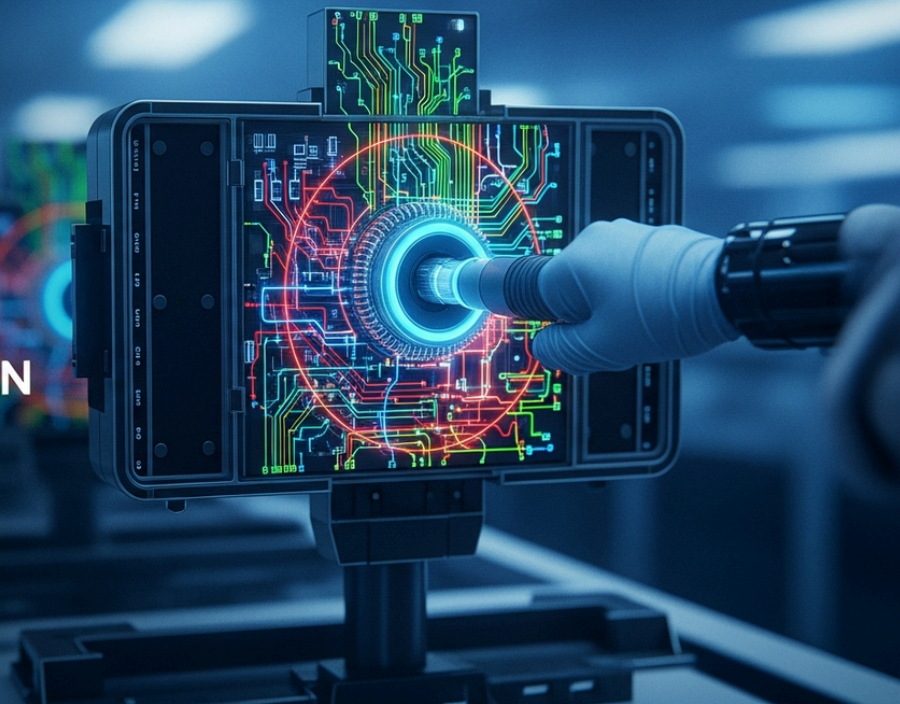
#18 Toyota Dominates Solid-State Battery State Estimation Patent Landscape: Patsnap Report Reveals 26 of 44 Patents Held

Published July 22, 2026 Patsnap Singapore

TOYOTA

**TOYOTA
SOLID-STATE
SOLID-STATE
STATE ESTIMATION
PATENT FIELD**

44 out of 26 Patents



OVERVIEW

According to Patsnap's 2026 Solid-State Battery State Estimation Patent Landscape report, Toyota Motor Corporation overwhelmingly dominates the intellectual property (IP) in this field, holding 26 out of 44 patent families. Honda Motor Co., Ltd. follows with 5 patents, while other applicants hold only one or two. This domain has seen a rapid increase in annual filings since 2021, indicating the growing importance of battery management technology for the practical application of solid-state batteries.

Key Findings

The 2026 Solid-State Battery State Estimation Patent Landscape report, published by the patent intelligence platform Patsnap, reveals that Toyota Motor Corporation has built an overwhelming intellectual property (IP) portfolio in this critical technological domain. According to the report, Toyota holds 26 out of 44 patent families related to solid-state battery state estimation, strongly leading the technological development in this area.

Technical and Clinical Details

Solid-state battery state estimation technology is crucial for accurately determining a battery's State of Charge (SoC), State of Health (SoH), and State of Power (SoP). This capability is indispensable for precise range displays in electric vehicles (EVs), effective battery life management, and maintaining safety. Compared to existing lithium-ion batteries that use liquid electrolytes, solid-state batteries present more complex behavior at the solid electrolyte and electrode interfaces, necessitating more sophisticated state estimation algorithms and sensor technologies. Toyota's patent holdings are presumed to focus on unique algorithms and sensor integration techniques that account for factors such as ion mobility in solid electrolytes, changes in interfacial resistance, and temperature distribution. The goal is to enhance the reliability and safety of all-solid-state batteries and ensure their long-term performance.

Background and Industry Context

All-solid-state batteries are considered the most promising candidates for next-generation batteries due to their high energy density, safety, and longevity. However, their practical implementation requires not only advances in battery performance itself but also sophisticated system technologies for optimal control and management. Accurately understanding the complex interfacial phenomena between solid electrolytes and lithium metal electrodes and estimating battery states in real-time is crucial for ensuring safety and reliability in EVs. As indicated by the Patsnap report, the rapid increase in patent filings in this state estimation domain since 2021 clearly signifies that solid-state battery development has entered a more mature phase, with increasing importance placed on ancillary technologies.

Strategic Significance and Outlook

Toyota Motor Corporation's robust IP portfolio in solid-state battery state estimation will provide a significant competitive advantage when the company launches EVs equipped with all-solid-state batteries. This technology is essential for maximizing battery performance while minimizing failure risks. Honda Motor Co., Ltd. also holds 5 patents in this area, suggesting that Japanese automakers are striving to establish leadership not only in core solid-state battery technology but also in its management systems. Moving forward, technological innovation and patent competition in this field are expected to intensify, with more refined battery management systems becoming a crucial factor in accelerating the widespread adoption of all-solid-state batteries.

Source: <https://www.patsnap.com/resources/blog/rd-blog/solid-state-battery-state-estimation-patent-landscape/>

Collected: July 24, 2026 | Automated Research System (Gemini API)